

What is claimed is:

1. Gearbox, particularly for a motor vehicle, with multiple shafts such as a first, at least single-piece and a second, at least single-piece gear input shaft and at least one gear output shaft, characterized by the combination of the following features:

- a) a multitude of gear pairs is arranged between the gear output shaft and the gear input shafts, consisting of an idler that is arranged around one of the shafts, respectively, and connected with it in a stationary manner, and a fixed wheel that is arranged so as to comb with the idler and in a stationary manner on a corresponding shaft for the purpose of forming gears with different gear ratios between the gear input shaft and one of the gear output shafts;
- b) at least one gear input shaft can be driven at least in part through a drive unit with a drive shaft;
- c) at least one gear input shaft can be connected with a first electric unit;
- d) the gear output shaft can be connected with at least one driving wheel;
- e) at least one gear can be actuated automatically with at least one actuator.

2. Gearbox in accordance with claim 1, wherein the drive unit is an internal combustion engine.

3. Gearbox in accordance with claim 1, wherein the drive unit is a second electric unit.
4. Gearbox in accordance with claim 3, wherein the electric units drive a gear input shaft, respectively.
5. Gearbox in accordance with claim 4, wherein the electric units have roughly the same dimensions.
6. Gearbox in accordance with claim 1, wherein the drive unit can be brought into motion with at least one gear input shaft through at least one clutch.
7. Gearbox in accordance with claim 6, wherein the drive unit can be connected with the gearbox through two clutches that are arranged in the power distribution flow between the drive shaft and the respectively connected gear input shaft.
8. Gearbox in accordance with claim 7, wherein at least one clutch is a friction clutch.
9. Gearbox in accordance with claim 7, wherein the clutches have the design of a double-clutch outside the gearbox.

10. Gearbox in accordance with claim 7, wherein at least one clutch is a shifting clutch.

11. Gearbox in accordance with claim 1, wherein the first electric unit can be uncoupled from the gear input shaft.

12. Gearbox in accordance with claim 1, wherein the first electric unit can be connected alternatively with the first or the second gear input shaft.

13. Gearbox in accordance with claim 12, wherein the switch between the two gear input shafts is performed through an electric, hydraulic, pneumatic or combined actuator.

14. Gearbox in accordance with claim 1, wherein the gear output shaft is arranged basically coaxially to the drive shaft.

15. Gearbox in accordance with claim 1, wherein at least one gear input shaft is arranged basically coaxially to the drive shaft.

16. Gearbox in accordance with claim 15, wherein a gear input shaft is arranged as a hollow shaft around the other gear input shaft.

17. Gearbox in accordance with claim 1, wherein the first electric unit is arranged around a gear output shaft and brings one of the gear input shafts into motion.

18. Gearbox in accordance with claim 1 with two gear output shafts and two gear input shafts, wherein some of the gears (I, III, IV, VI) between the first gear output shaft and one of the gear input shafts, respectively, and some of the other gears (II, IV, R) between the second gear output shaft and one of the two gear input shafts, respectively, can be shifted and the electric unit can bring at least one of these shafts into motion.

19. Gearbox in accordance with claim 1, wherein the gear pairs that form the individual gears (I, II, III, IV, V, VI, R) are arranged alternating on the two gear input shaft in dependence of the gear ratios.

20. Gearbox in accordance with claim 19, wherein the gearbox is equipped with at least four, preferably six separate forward speeds I through VI and optionally with a reverse speed R, with the gear I with the smallest gear ratio, gears III and V being arranged on a gear input shaft and gears II, IV and the gear VI with the largest gear ratio on the other gear input shaft as well as the optional reverse gear R on one of the two gear input shafts.

21. Gearbox in accordance with claim 1, wherein the idlers are arranged preferably on at least one gear output shaft.

22. Gearbox in accordance with claim 1, wherein the coupling of an idler to the appropriate gear input shaft or gear output shaft occurs in a synchronized manner with regard to a differential r.p.m. between the idler and the shaft holding the wheel.

23. Gearbox in accordance with claim 22, wherein the synchronization process occurs with a synchronizing device.

24. Gearbox in accordance with claim 22, wherein the synchronization process occurs while coupling at least one idler to the shaft that holds the idler with the help of an electric unit.

25. Gearbox in accordance with claim 1, wherein the first electric unit is arranged on an end of the gear input shaft that is located opposite the drive unit.

26. Gearbox in accordance with claim 6, wherein the first electric unit is arranged around the clutch.

27. Gearbox in accordance with claim 1, wherein in relation to a rotor shaft the first electric unit is arranged roughly parallel to the gear input shaft, with which it is connected from a drive point of view.
28. Gearbox in accordance with claim 1, wherein at least one secondary unit is connected with the first electric unit from a drive point of view.
29. Gearbox in accordance with claim 28, wherein the secondary unit can be uncoupled from the first electric unit through a secondary unit coupling.
30. Gearbox in accordance with claim 28, wherein the secondary unit has a gear ratio with the first electric unit.
31. Gearbox in accordance with claim 30, wherein the gear ratio is variable.
32. Gearbox in accordance with claim 1, wherein a torsional oscillation dampening device is brought into motion in the power distribution flow between the drive shaft and the gear input shafts.
33. Gearbox in accordance with claim 31, wherein the torsional oscillation dampening device is a two-mass flywheel.

34. Gearbox in accordance with claim 32, wherein at least one of the clutch disks provided in the clutches is equipped with one at least one-step torsional oscillation dampening device.

35. Gearbox in accordance with claim 1, wherein the connection between the drive shaft (4) and at least one gear input shaft is multiplied or reduced with regard to its gear ratio.

36. Gearbox in accordance with claims 1, wherein at least one of the clutches and/or one gear (I, II, III, IV, V, VI, R) can be shifted automatically in dependence of the driving situation.

37. Gearbox in accordance with claim 36, wherein shifting of at least one clutch and at least one gear occurs with at least one actuator, respectively.

38. Gearbox in accordance with claim 37, wherein the actuator is operated electrically, hydraulically, pneumatically or with a combination.

39. Gearbox in accordance with claim 36, wherein at least one actuator axially feeds one sliding sleeve, respectively, for two neighboring gears (II, IV; I, III; V, R) on one of the two gear input shafts, with this sleeve forming a stationary connection to the idler through a shifting clutch in dependence of its axial position or

with the sleeve possibly taking on a neutral position, in which position the two idlers can be rotated against the gear input shaft and/or the gear output shaft.

40. Gearbox in accordance with claim 11, wherein the electric unit can be connected with one of the gear input shafts through a shifting clutch that is provided for shifting an individual gear (VI).

41. Gearbox in accordance with claim 11, wherein the electric unit that is connected with a gear input shaft from a drive point of view can be connected with the gear output shaft through a shifting clutch for the purpose of shifting a gear (VI), with the transfer of torque occurring through the toothed wheels that form the gear ratio of the gear (VI).

42. Gearbox in accordance with claim 1, wherein a gear (IV) on the first gear input shaft and a gear (II) on the other gear input shaft, respectively, can be shifted so as to transfer the torque from an electric unit that is brought into motion with one of these gears (II, IV) to the drive shaft through one of the gear input shafts, without transferring any torque from the gear input shafts to at least one driving wheel.

43. Gearbox in accordance with claim 42, wherein, in the case of a connection of the two gears (II, IV) without torque transfer onto at least one driving wheel and disengaged clutch in the power distribution flow between the drive shaft

of the internal combustion engine and one of the gear input shafts, the internal combustion engine is started with the electric unit.

44. Method for operating a gearbox particularly in accordance with one of the claims 1 through 43, characterized by the following steps:

- the drive unit drives at least one of the two gear input shafts at least some of the time;
- the first electric unit drives one of the gear input shafts at least some of the time;
- the first electric unit is driven by one of the gear input shafts at least some of the time.

45. Method in accordance with claim 44 with additional features for starting the drive unit, which has the design of an internal combustion engine with a drive shaft, preferably in the cold state, with this unit being able to be connected with a gear input shaft, respectively, through two clutches:

- both clutches are engaged;
- no gear (II, IV, VI) has been engaged between the first gear input shaft, with which the first electric unit is connected from a drive point of view, and the gear output shaft;
- a gear (I) with preferably a small gear ratio (multiplication or reduction) has been engaged between the second gear input shaft and the gear output shaft;
- the first electric unit is driving the first gear input shaft;

- the clutch in the power distribution flow between the first gear input shaft and the drive shaft is disengaged after reaching the speed that is required for a cold start of the electric unit;
- after starting the drive unit the clutch in the power distribution flow between the drive shaft and the second gear input shaft is disengaged and the vehicle starts to move.

46. Method in accordance with claim 44 with additional features for starting the drive unit, which has the design of an internal combustion engine with a drive shaft, preferably in the warmed-up state, with this unit being able to be connected with a gear input shaft, respectively, through two clutches:

- no gear has been engaged between the first gear input shaft, with which the first electric unit is connected from a drive point of view, and the gear output shaft (3);
- a gear (I) with preferably a small gear ratio (multiplication or reduction) has been engaged between the second gear input shaft and the gear output shaft;
- the clutch in the power distribution flow between the first gear input shaft and the drive shaft is disengaged;
- the first electric unit is being driven and the drive unit is started;
- by disengaging the clutch in the power distribution flow between the drive shaft and the second gear input shaft the vehicle starts to move.

47. Method in accordance with claim 44 with additional features for operating the first electric unit as a generator for producing electric energy:

- the first electric unit is driven by the drive unit or for a driving mode such as recuperation by at least one driving wheel;
- when driven by the drive unit, optionally one of the two clutches in the power distribution flow between the drive shaft and a gear input shaft is disengaged;
- when driven by at least one driving wheel, both clutches are engaged.

48. Method in accordance with claim 47, wherein the electric unit is coupled to the drive unit in dependence on the state of charge of electric energy storage systems.

49. Method in accordance with claim 44, characterized by the following possibilities for torque flow from the drive unit to the first electric unit during generator operation or during recuperation:

- the torque is transferred from the drive shaft of the drive unit through the disengaged clutch in the power distribution flow between the first gear input shaft carrying the electric unit and the drive shaft to the first gear input shaft and from there to the rotor shaft of the electric unit;
- the torque is transferred from the drive shaft of the drive unit through the disengaged clutch in the power distribution flow between the second gear input shaft without electric unit through a pair of gears to the gear output shaft, from there to the first gear input shaft through a pair of gears and from there to the rotor shaft;

- the torque is transferred from at least one driving wheel to the gear output shaft and from there to the rotor shaft of the first electric unit through a pair of gears via the first gear input shaft.

50. Method in accordance with claim 49, wherein the first electric unit is operated at an r.p.m., preferably by selecting appropriate gear pairs between the gear output shaft and the first gear input shaft, at which it reaches optimal function with regard to its efficiency.

51. Method in accordance with claim 49, wherein the drive unit is uncoupled from the first gear input shaft in a delayed manner during recuperation with a switch from "pull" to "push" by engaging the clutch between the first gear input shaft and the drive shaft, preferably after > 0.3s after the switch from "pull" to "push."

52. Method in accordance with claim 44, wherein the first electric unit transfers torque, either in addition or alternatively to the drive unit, to at least one driving wheel for driving the motor vehicle via a gear input shaft and a pair of gears between this gear input shaft and the gear output shaft.

53. Method in accordance with claim 44, wherein during the shifting processes for synchronizing purposes the first gear input shaft with the first electric unit is slowed down or accelerated during the torque flow via the second gear input

shaft by disengaging the clutch between the drive unit and the first gear input shaft at least briefly.

54. Method in accordance with one of the claims 44 through 53, wherein the following shifting steps are performed when shifting from one gear (VI, IV; V, III) to a new gear (IV, II; III, I) with a lower gear ratio on the same gear input shaft:

- adjustment of the drive unit to increased power, preferably full load;
- slipping operation of the clutch in the power distribution flow between a first gear input shaft, on which the gears that are to be shifted are arranged, and the drive shaft;
- upon reaching the synchronous speed on the clutch between the drive shaft and a second gear input shaft with regard to a gear (III, I; IV, II) that in relation to its gear ratio is located on the first gear input shaft between the gears (VI, IV, II; V, III, I) that are to be shifted, this clutch is operated in a slipping manner and torque is directed to at least one driving wheel through the gear output shaft via the gear (III, I; IV, II), which with regard to its gear ratio is located on the second gear input shaft between the gears (VI, IV, II; V, III, I);
- the clutch between the drive shaft and the second gear input shaft is being disengaged;
- upon reaching the synchronous speed of the new gear (IV, II; III, I) that is supposed to be engaged on the one gear input shaft, shifting to this gear takes place.

55. Method in accordance with claim 54, wherein during the shifting process from one gear (VI, IV) to a new gear (IV, II) with a lower gear ratio on the same gear input shaft that is connected with a electric unit, the electric unit is activated during the synchronization process to the new gear for synchronization purposes.

56. Method in accordance with claim 44, wherein for the purpose of synchronizing at least one new gear (II, IV, VI) that will be shifted to, preferably the gear (II) with the lowest gear ratio on the gear input shaft with an electric unit connection for drive purposes, the electric unit decelerates the gear input shaft that is connected with it while the vehicle is accelerated through the gear input shaft without electric unit.

57. Method in accordance with claim 56, wherein the electric unit largely decelerates the gear input shaft, if necessary with the help of additional synchronizing equipment, to the synchronous speed of the new gear (II, IV, VI) that is to be shifted to.

58. Method in accordance with claim 44, wherein an electric unit can be coupled to a gear input shaft through a shifting clutch for the gear with the highest gear ratio, with the following shifting states of the shifting clutch:

- the idler of the gear pair of the gear (VI) is arranged on the gear input shaft in an articulating manner, the electric unit is uncoupled from the gear input shaft;

- the electric unit is coupled to the gear input shaft, the idler can be rotated in relation to the gear input shaft;
- the idler is connected with the gear input shaft in a stationary manner, the electric unit is coupled with the gear input shaft;
- the electric unit is connected with the idler, the idler can be rotated in relation to the gear input shaft.

59. Method in accordance with claim 44, characterized by the procedural steps for operating a motor vehicle with the first electric unit, wherein on one hand at least the clutch between the gear input shaft, to which the electric unit can be coupled, and the drive shaft is engaged, and wherein first the shifting clutches of the other gear input shaft are in a neutral position or secondly both clutches are engaged, and wherein depending on the driving situation the torque is accordingly transferred from the electric unit to at least one driving wheel through an active selected pair of gears between the gear input shaft and the gear output shaft.

60. Method in accordance with claim 44, characterized by procedural steps for supporting the drive unit in the operation of the motor vehicle with the first electric unit, wherein in a power distribution flow from the drive shaft to the gear output shaft via the gear input shaft, which can be coupled with the first electric unit, the first electric unit directly influences the gear input shaft, and wherein in a power distribution flow via the gear input shaft without electric unit, the clutch is engaged with the electric unit between the drive shaft and the gear input shaft and the torque

that is furnished by the electric unit is transferred to the gear output shaft via a selected pair of gears in dependence of the driving situation.

61. Method in accordance with claim 44, characterized by a starting procedure, particularly for a cold internal combustion engine, in connection with a sliding sleeve with three control settings that is arranged on a split gear output shaft, wherein this sleeve shifts optionally to one of two gears (II, V) arranged on different gear input shafts between these gears and the gear output shaft, connects the idlers of these gears (II, V) or assumes a neutral position without connecting functions, with at least the following procedural steps:

- no gear is engaged between the first gear input shaft, which is actively connected with the electric unit, and the gear output shaft;
- the idlers of the gears (II, V) are connected with each other through the sliding sleeve;
- the clutch in the power distribution flow between the second gear input shaft and the drive shaft is disengaged;
- the electric unit is being driven and the drive unit is being started;
- the clutch between the drive unit and second gear input shaft is being engaged;
- the second gear input shaft is decelerated to a negligible speed, for example, through the electric unit;
- the sliding sleeve with the three control settings is moved into the neutral position;

- a gear (I) with a small gear ratio between the second gear input shaft and gear output shaft is engaged;
- by closing the clutch in the power distribution flow between the drive shaft and the second gear input shaft the vehicle starts to move.

62. Method in accordance with claim 44 for starting the cold (not warmed-up) internal combustion engine, characterized by the following procedural steps:

- the clutch in the power distribution flow between the gear input shaft, with which the electric unit is connected, and the drive shaft is open;
- no gear has been engaged;
- the clutch in the power distribution flow between the gear input shaft without electric unit and the drive shaft is being disengaged;
- one idler of a gear of the gear input shaft with electric unit and one idler of a gear of the gear input shaft without electric unit, respectively, are connected with each other from a drive point of view;
- the electric unit is supplied with power and starts the internal combustion engine through the power branch involving rotor, gear input shaft with electric unit, gear pair of the gear on the gear input shaft with electric unit, gear pair of the gear on the gear input shaft without electric unit, gear input shaft without electric unit, clutch between gear input shaft without electric unit and drive shaft, drive shaft.

63. Method in accordance with claim 44, wherein during a shifting process from a first gear (II, IV) on a first gear input shaft, which is actively connected with an electric unit, to a second gear (III, V) - with a higher gear ratio than the first gear - on a second gear input shaft torque is transmitted to the electric unit via the clutch between the drive shaft and the first gear input shaft until the drive shaft has roughly the speed that is required for the jerk-free operation of the second gear (III, V).

64. Gearbox (1; 101), particularly for a motor vehicle with a multitude of shafts such as a first, at least single-piece and a second, at least single-piece gear input shaft and at least one gear output shaft, characterized by the combination of the following features:

- a) a multitude of gear pairs forming different gear ratios (I, II, III, IV, V, VI, R) are arranged between the gear output shaft and the gear input shafts, with the gear pairs, respectively, being formed by a gear wheel that is firmly connected with a shaft and an idler that can be connected to a shaft, wherein the gear ratios are activated by connecting an idler with the shaft that carries it;
- b) at least one gear input shaft can be connected with a crankshaft of an internal combustion engine at least some of the time through a clutch;
- c) the gear output shaft can be connected with at least one driving wheel;
- d) at least one gear ratio (I, II, III, IV, V, VI, R) can be actuated automatically with at least one actuator;

e) when shifting between gear ratios (I, III, V, R; II, IV, VI) that are assigned to this gear input shaft, at least a first gear input shaft is synchronized through a synchronizing device, which is provided on a single last gear pair that is arranged on one of these gear input shafts, wherein this last gear pair is provided for achieving the largest possible speed on the gear output shaft with regard to its gear ratio in relation to the other gear ratios (I, III; II, IV) of this gear input shaft.

65. Gearbox in accordance with claim 64, wherein at least a second gear input shaft is actively connected with an electric unit.

66. Gearbox in accordance with claim 65, wherein no synchronizing device is provided on the second gear input shaft and the electric unit synchronizes the second gear input shaft with the gear output shaft when shifting between two gear ratios (II, IV, VI) that are arranged on the second gear input shaft.

67. Gearbox in accordance with claim 64, wherein the gear ratios are engaged by connecting an idler with a shaft that carries it through an end output element, which is part of an end output mechanism that is actuated by an end actuating mechanism, and wherein the shifting sequence of the gear ratios is not set in the end actuating mechanism.

68. Gearbox, particularly in accordance with claim 67, wherein the end actuating mechanism comprises at least one main actuating element such as

shifting fingers, which actively connects with the end output mechanisms so as to allow to engage a gear ratio and wherein at least one main actuating element can be actively connect with another end output mechanism without having to disengage the previously engaged gear ratio, characterized by the fact that the end actuating mechanism comprises at least one secondary actuating element.

69. Gearbox, particularly in accordance with claim 68, wherein at least one secondary actuating element actively connects with at least one additional end output mechanism as soon as at least one main actuating element actively connects with an end output mechanism.

70. Gearbox, particularly in accordance with claim 69, wherein upon actuating an end output mechanism for engaging a gear ratio through at least one main actuating element simultaneously at least one additional end output mechanism is actuated through at least one secondary actuating element for disengaging the appropriate gear ratios.

71. Gearbox, particularly in accordance with at least one of the claims 67 through 70, wherein only one gear ratio of one gear input shaft, respectively, can be engaged at the same time.

72. Gearbox, particularly in accordance with claim 68, wherein for the purpose of synchronizing at least first gear input shaft on the gear output shaft

during a gear ratio switch the synchronizing device on the last gear pair is actuated through a main actuating element and wherein in the same torsional movement of a control shaft that is part of the end actuating mechanism the engaged gear is disengaged through an secondary actuating element.

73. Gearbox, particularly in accordance with claim 68, wherein the end output mechanisms comprise connecting elements such as shifting forks, which are equipped with a first functional area for engagement of a main actuating element and a second functional area for engagement of an secondary actuating element.

74. Gearbox, particularly in accordance with claim 73, wherein at least one secondary actuating element is arranged on a control shaft that can rotate around its longitudinal axis upon actuation and wherein the second functional area is designed in such a way that upon rotating the control shaft force can be transferred from one secondary actuating element to the second functional area in the disengaging direction of the appropriate gear ratio, which is equal to or larger than the force that is required for disengagement.

75. Gearbox, particularly in accordance with claim 68, wherein at least one secondary actuating element can be brought into motion with at least two second functional areas.

76. Gearbox, particularly in accordance with claim 75, wherein at least one secondary actuating element is particularly wide in the control shaft axial direction.

77. Gearbox, particularly in accordance with claim 64, wherein at least one secondary actuating element and the second functional areas interact so as to disengage a gear ratio when rotating the control shaft independent from the rotational direction.

78. Gearbox in accordance with claim 77, wherein at least one secondary actuating element and the second functional areas are of symmetrical design.

79. Gearbox in accordance with claim 77, wherein at least one secondary actuating element is equipped with two cam-like end areas and the second functional areas are equipped with corresponding recesses.

80. Gearbox in accordance with claim 77, wherein the second functional areas are equipped with two cam-like end areas and at least one secondary actuating element is equipped with corresponding recesses.

81. Gearbox in accordance with claim 77, wherein power transmission between the secondary actuating element and the second functional area occurs through the tips of the cam-like end areas.

82. Gearbox in accordance with claim 77, wherein power transmission between the secondary actuating element and the second functional area occurs through the side areas of the cam-like end areas.